FORM NRC-313 I (3-80) 10 CFR 30

U.S. NUCLEAR REGULATORY COMMISSION

APPLICATION FOR BYPRODUCT MATERIAL LICENSE
INDUSTRIAL

1. APPLICATION FOR: *(Check and/or complete as appropriate)*

X	a. NEW LICENSE
	b. AMENDMENT TO: LICENSE NUMBER
	c. RENEWAL OF: LICENSE NUMBER

See attached instructions for details.

Completed applications are filed in duplicate with the Division of Fuel Cycle and Material Safety, Office of Nuclear Material Safety, and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555 or applications may be filed in person at the Commission's office at 1717 H Street, NW, Washington, D. C. or 7915 Eastern Avenue, Silver Spring, Maryland.

2. APPLICANT'S NAME *(Institution, firm, person, etc.)*
MILWAUKEE TESTING DIVISION
WARZYN ENGINEERING, INC.

TELEPHONE NUMBER: AREA CODE – NUMBER EXTENSION
(414) 321-0100

3. NAME AND TITLE OF PERSON TO BE CONTACTED REGARDING THIS APPLICATION
JOHN W. DOUGHERTY

TELEPHONE NUMBER: AREA CODE – NUMBER EXTENSION
(414) 321-0100

4. APPLICANT'S MAILING ADDRESS *(Include Zip Code)*
(Address to which NRC correspondence, notices, bulletins, etc., should be sent.)
2135 South 116th Street
Milwaukee, WI 53227

5. STREET ADDRESS WHERE LICENSED MATERIAL WILL BE USED *(Include Zip Code)*
Same as 4 plus temporary job sites in Wisconsin

(IF MORE SPACE IS NEEDED FOR ANY ITEM, USE ADDITIONAL PROPERLY KEYED PAGES.)

6. INDIVIDUAL(S) WHO WILL USE OR DIRECTLY SUPERVISE THE USE OF LICENSED MATERIAL
(See Items 16 and 17 for required training and experience of each individual named below)

FULL NAME	TITLE
a. John W. Dougherty, P.E.	Director of Technical Operations
b. William G. Aleks	Civil Engineer
c. Raymond Stevens, Jr. Steve Becker	Sr. Technician Sr. Technician

7. RADIATION PROTECTION OFFICER
John W. Dougherty

Attach a resume of person's training and experience as outlined in Items 16 and 17 and describe his responsibilities under Item 15.

8. LICENSED MATERIAL

LINE NO.	A. ELEMENT AND MASS NUMBER	B. CHEMICAL AND/OR PHYSICAL FORM	C. NAME OF MANUFACTURER AND MODEL NUMBER *(If Sealed Source)*	D. MAXIMUM NUMBER OF MILLICURIES AND/OR SEALED SOURCES AND MAXIMUM ACTIVITY PER SOURCE WHICH WILL BE POSSESSED AT ANY ONE TIME
(1)	CESIUM 137		Troxler Laboratories Tel A-102112	3 Sources 8 millicuries
(2)	AMERICIUM 241		Troxler Laboratories Tel A 102451	3 Sources 40 millicuries
(3)	RADIUM 226		Seaman Nuclear Corp.	1 Source 4.5 millicuries
(4)	RADIUM 226/BERYLLIUM		Troxler Laboratories Special Form Type A	1 Source 2.0 millicuries

LINE NO.	E. DESCRIBE USE OF LICENSED MATERIAL
(1)	for use in Troxler Model 3401 or 3411 surface moisture-density gauges
(2)	" " " " " " "
(3)	for use in Seaman Nuclear C-75 moisture-density gauge
(4)	for use in Troxler Model 2401 surface moisture-density gauge

9. STORAGE OF SEALED SOURCES

LINE NO.	CONTAINER AND/OR DEVICE IN WHICH EACH SEALED SOURCE WILL BE STORED OR USED. A.	NAME OF MANUFACTURER B.	MODEL NUMBER C.
(1)	Surface Moisture-Density Gauge	Troxler Laboratories, Inc.	3401
(2)	" " "	" "	3411B
(3)	Nuclear Moisture Density Gauge	Seaman Nuclear Corp.	75
(4)	Surface Moisture Density Gauge	Troxler Laboratories, Inc.	2401

10. RADIATION DETECTION INSTRUMENTS

LINE NO.	TYPE OF INSTRUMENT A	MANUFACTURER'S NAME B	MODEL NUMBER C	NUMBER AVAILABLE D	RADIATION DETECTED (alpha, beta, gamma, neutron) E	SENSITIVITY RANGE (milliroentgens/hour or counts/minute) F
(1)	Non Required					
(2)						
(3)						
(4)						

11. CALIBRATION OF INSTRUMENTS LISTED IN ITEM 10

☐ a. CALIBRATED BY SERVICE COMPANY

NAME, ADDRESS, AND FREQUENCY

☐ b. CALIBRATED BY APPLICANT

Attach a separate sheet describing method, frequency and standards used for calibrating instruments.

12. PERSONNEL MONITORING DEVICES

TYPE (Check and/or complete as appropriate.) A	SUPPLIER (Service Company) B	EXCHANGE FREQUENCY C
☒ (1) FILM BADGE ☐ (2) THERMOLUMINESCENCE DOSIMETER (TLD) ☐ (3) OTHER (Specify): _____	R. S. Landauer, Jr. Co. Glenwood Science Park Glenwood, Illinois 60425	☒ MONTHLY ☐ QUARTERLY ☐ OTHER (Specify):

13. FACILITIES AND EQUIPMENT (Check were appropriate and attach annotated sketch(es) and description(s).

☐ a. LABORATORY FACILITIES, PLANT FACILITIES, FUME HOODS (include filtration, if any), ETC.
☐ b. STORAGE FACILITIES, CONTAINERS, SPECIAL SHIELDING (fixed and/or temporary), ETC.
☐ c. REMOTE HANDLING TOOLS OR EQUIPMENT, ETC.
☐ d. RESPIRATORY PROTECTIVE EQUIPMENT, ETC. N/A

14. WASTE DISPOSAL

a. NAME OF COMMERCIAL WASTE DISPOSAL SERVICE EMPLOYED N/A

b. IF COMMERCIAL WASTE DISPOSAL SERVICE IS NOT EMPLOYED, SUBMIT A DETAILED DESCRIPTION OF METHODS WHICH WILL BE USED FOR DISPOSING OF RADIOACTIVE WASTES AND ESTIMATES OF THE TYPE AND AMOUNT OF ACTIVITY INVOLVED. IF THE APPLICATION IS FOR SEALED SOURCES AND DEVICES AND THEY WILL BE RETURNED TO THE MANUFACTURER, SO STATE.

Sources will be returned to manufacturer for disposal

INFORMATION REQUIRED FOR ITEMS 15, 16 AND 17

Describe in detail the information required for Items 15, 16 and 17. Begin each item on a separate page and key to the application as follows:

15. RADIATION PROTECTION PROGRAM. Describe the radiation protection program as appropriate for the material to be used including the duties and responsibilities of the Radiation Protection Officer, control measures, bioassay procedures *(if needed)*, day-to-day general safety instruction to be followed, etc. If the application is for sealed source's also submit leak testing procedures, or if leak testing will be performed using a leak test kit, specify manufacturer and model number of the leak test kit.

16. FORMAL TRAINING IN RADIATION SAFETY. Attach a resume for each individual named in Items 6 and 7. Describe individual's formal training in the following areas where applicable. Include the name of person or institution providing the training, duration of training, when training was received, etc.

    a. Principles and practices of radiation protection.

    b. Radioactivity measurement standardization and monitoring techniques and instruments.

    c. Mathematics and calculations basic to the use and measurement of radioactivity.

    d. Biological effects of radiation.

17. EXPERIENCE. Attach a resume for each individual named in Items 6 and 7. Describe individual's work experience with radiation, including where experience was obtained. Work experience or on-the-job training should be commensurate with the proposed use. Include list of radioisotopes and maximum activity of each used.

18. CERTIFICATE

(This item must be completed by applicant)

The applicant and any official executing this certificate on behalf of the applicant named in Item 2, certify that this application is prepared in conformity with Title 10, Code of Federal Regulations, Part 30, and that all information contained herein, including any supplements attached hereto, is true and correct to the best of our knowledge and belief.

WARNING.–18 U.S.C., Section 1001; Act of June 25, 1948; 62 Stat. 749; makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.

a. LICENSE FEE REQUIRED *(See Section 170.31, 10 CFR 170)*	b. CERTIFYING OFFICIAL *(Signature)* Patrick J. Harrison
	c. NAME *(Type or print)* Patrick J. Harrison
(1) LICENSE FEE CATEGORY: 3e (Byproduct Mat'l Sealed Source)	d. TITLE Division Manager
(2) LICENSE FEE ENCLOSED: $ 190.00	e. DATE 9/18/81

FORM NRC 313 1 (3-80)

ATTACHMENT TO APPLICATION
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ITEM 15 RADIATION PROTECTION PROGRAM

I. Training - Personnel must have received appropriate training in the operation of nuclear moisture-density gauges and in radiation safety. Troxler Laboratories courses or instruction by Radiation Safety Officer are required. (Course outline and sample examination are attached.)

II. Radiation Monitoring - Personnel using nuclear gauges must wear film badge monitors which are changed monthly.

III. Leak Testing - Nuclear moisture-density gauges are leak tested every six months using Troxler Laboratories Model 3880 Leak Test Kit.

IV. General Radiation Safety - Operating procedures, accident procedures and reporting requirements are prominently posted in the equipment storage area. Operators and storage are monitored by the Radiation-Safety Officer.

V. Duties of Radiation Safety Officer

1. Maintain appropriate federal and state licenses.

2. Maintain required records including film badge records and leak test reports.

3. Insure that personnel using nuclear gauges have received operating and safety instruction.

4. Conduct inspections of storage area and field operations to insure safe storage and operation.

5. Conduct training course and examination for new operators.

6. Insure that nuclear gauges are properly maintained.

MILWAUKEE TESTING

ATTACHMENT TO ... ...ON
FOR BYPRODUCT MATERIAL LICENSE

MILWAUKEE TESTING
DIVISION OF WARZYN ENGINEERING INC.

Consulting Geotechnical Engineers • Materials Testing • Soil Borings
2135 SO. 116TH STREET, MILWAUKEE, WIS. 53227 • TEL. (414) 321-0100

Radiological Training Course for Soil and Asphalt Nuclear Gage Operation

Classroom 3 Hrs.

1. Principals of Radiation:

   a. Origin of Radiation:

      Atom's Structure
      Radioisotopes (Unstable Nucleus)
      J. Curie

   b. Energy & Activity:

      Electron Volt
      Curie and Rem
      Half Life of Energy
      Radiation Types (Alpha, Beta, Gamma (x-ray), Neutron)

   c. Introduction of Troxler Gages:

      Construction
      Power & Nuclear Source
      Geiger - Mueller Tubes (Detectors)
      Radiation & Soil Resistance
      (Penetration & Refelction)
      Parts & Assemblies

   d. Calibration & Field Operation:

      Calibration Base and Procedures
      Calibration Chart (recalibration)
      Density & Moisture Content Determination
      (Direct Transmission, Back Scatter, Airgap)
      Relative Density & Moisture Content Determination
      Location & Site Sketch
      Results & Communication with Partners
      Time & Miles Charge

e. General Safety:

Biological Effect of Radiation
Internal & External Radiation Hazard
Health & Radiation Dose Control
Film Badges, and Other Dose-Meters
Maximum Permissible Levels of Absorbed Dos
Annual Personnel Dose Report

f. Safety of Field Operation & Transportation

Gage Storage in Laboratory
Gage Storage in Field
Transportation Safety Requirements
Accident in Field or During Transportation
(Nuclear Source Safety Storage, Report, Witnesses)

Field Training: (Test Practice) 2 Hrs

g. Calibration

Site Preparation (ASTM Standard)
Standard Count (Surface & Trench Calibration)
Test Counts (Density & Moisture)
Count Ratio (PCF)
Use of Calibration Tables
Computation of Relative Density & Moisture - in Field
Location & Site Sketch on Field
Safety & Transportation

Written Examination 1 Hr.

References:

1. Hutchinson, F.W., Nuclear Radiation Engineering, Ronald Press Company, New York 1960.

2. Troxler Laboratories, 3400 Series Instruction Manual.

3. Seaman Nuclear Corporation, Model 75 Operator's Manual.

4. 10CFR Part 19, "Notices, Instructions and Reports to Workers, Inspections".

5. 10CFR Part 20, "Standards for Protection Against Radiation".

6. 10CFR Part 30, "Rules of General Applicability to Licensing of Byproduct Material".

7. Wisconsin Administrative Code, (Section H57) Rules of the State Board of Health, "Radiation Protection Code".

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MILWAUKEE TESTING
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EXAMINATION FOR USERS OF TROXLER "MOISTURE-DENSITY" GAUGES

1. What is name of smallest part of material: Atom

2. How many millions of average size atoms are 1" length:
   (a) 150
   (b) 200
   (c) 250 X
   (d) 300

3. What is the name of the central part of atom?
   (a) Electron
   (b) Neutron
   (c) Proton
   (d) Nucleus X

4. What causes radioactivity?
   (a) Ionization
   (b) Unstable Proton
   (c) Unstable Nucleus X
   (d) Stable Nucleus

5. Ion Chambers are used for:
   (a) Neutron and Electron Gauges
   (b) Density Gauge Detectors
   (c) Neutron Detectors
   (d) Gamma Ray Detectors X

6. The Nuclear "Moisture-Density" Gauge is dependent upon:
   (a) Proton
   (b) Gamma X
   (c) Neutron
   (d) Alpha

   emissions from a power source

7. The Geiger-Mueller Tubes are used to count:
   (a) Beta Particles
   (b) Alpha Particles
   (c) Proton Particles
   (d) Gamma Rays X

EXAMINATION FOR USERS OF TROXLER "MOISTURE-DENSITY" GAUGES

8. Name the unit of measurement of radiation absorbed by the body.
   (a) Rem X
   (b) Curie
   (c) Gamma
   (d) Alpha

9. If the radiation level 1' from nuclear source is 40 millirem/hr. the radiation level 2' from the gauge is?
   (a) 20 mr/hr.
   (b) 30 mr/hr.
   (c) 5 mr/hr.
   (d) 10 mr/hr. X

10. What are two basic ways to protect yourself against radiation in the field?
   (a) Distance and interposition from source X
   (b) Distance and shielding of source
   (c) Place shielding material
   (d) Do nothing

11. What is the permissible 13 week, whole body exposure permitted by regulations?
   (a) 18,000 millirems
   (b) 1,250 millirems X
   (c) 4,000 millirems
   (d) 96 millirems

12. What is the nuclear energy source used in Troxler 3400 Series Moisture-Density Gauges used by Milwaukee Testing?
   (a) Radium 226
   (b) Beryllium
   (c) Cesium 137 and Americium 241 X
   (d) Americium 241

13. What are names of the agencies which control and issue the radioactive material licenses?
   (a) Industrial Safety Board
   (b) City of Milwaukee Health Department
   (c) U.S. Nuclear Regulatory Commission & State of Wisconsin Health Department X
   (d) U.S. Safety Board

14. Is personnel radiation exposure controlled by law?
   (a) No
   (b) Yes X

15. Is annual written information for gauge users about radiation exposure required by law?
   (a) No
   (b) Yes X

MILWAUKEE TESTING

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EXAMINATION FOR USERS OF TROXLER "MOISTURE-DENSITY" GAUGES

16. Is leak testing of nuclear-source required by law" How frequently?
    (a) Not at all_____
    (b) Yes, each 6 months__X__
    (c) Yes, each year_____
    (d) Yes, each second year _____

17. What should you do with your personal film badge when it is not in use?
    (a) Keep it on the window sill_____
    (b) Store it with gauge in nuclear-gauge cabinet_____
    (c) Be left at home at all times_____
    (d) Keep in the office in safe place__X__

18. Name the material that causes the greatest energy loss of fast neutrons (Unit weight)?
    (a) Oxygen_____
    (b) Wet rock_____
    (c) Steel_____
    (d) Hydrogen__X__

19. What labeling is required in areas where the radioactive gauges are stored, and on vehicles transporting radioactive materials?
    (a) Danger - Explosives_____
    (b) Do Not Enter_____
    (c) Caution - Radioactive Materials__X__
    (d) Do Not Enter - High Radiation Area_____

20. In case of physical damage to a nuclear gauge, how do you protect the area and report the accident?
    (a) Call local police_____
    (b) Build a barricade, cover with wet soil and call the Radiological Safety Officer__X__
    (c) Call Firemen_____
    (d) Call Health Department_____

21. In case of physical damage to a nuclear gauge on the highway, how do you protect the area and report the accident?
    (a) Protect the area with traffic-cone, protect gauge and call police and Company__X__
    (b) Call police_____
    (c) Call Firemen_____
    (d) Call Health Department_____

22. In case of physical damage to a nuclear gauge in the laboratory, what should you do?
    (a) Protect the area, call Radiological Safety Officer__X__
    (b) Report to local police_____
    (c) Call Firemen_____
    (d) Call Atomic Energy Commission_____

MILWAUKEE TESTING

EXAMINATION FOR USERS OF TROXLER "MOISTURE-DENSITY" GAUGES

23. May you use the nuclear gauge anywhere in the U.S.A.?
    (a) No, only in Wisconsin, and a few other states_____
    (b) Only in Milwaukee_____
    (c) At any location in the U.S.A._____
    (d) Only in areas specified by License__X__

24. Can gamma rays cause biological damage to the human body? What part?
    (a) None at all_____
    (b) Yes, but only for eyes_____
    (c) Yes, any portion of the human body, and genetic damage __X__
    (d) Yes, but only for skin_____

25. Why is the standard count required?
    (a) To check gauge electronic circuit_____
    (b) To check original moisture calibration_____
    (c) To check original density calibration_____
    (d) To minimize the possibility of error in moisture and density readings due to background radiation__X__

26. The Troxler Moisture-Density Gauges are calibrated to measure:
    (a) Soil moisture in kilograms_____
    (b) Density in grams_____
    (c) Moisture in per cent_____
    (d) Wet density and moisture in pounds__X__

27. May the nuclear gauge be used in visible water, or through water, if water is present on soil surface?
    (a) Yes_____
    (b) No__X__

28. In the direct transmission position does the gauge measure the average density of material between Geiger-Mueller Tubes and source?
    (a) Yes__X__
    (b) No_____

29. When determining asphalt density what is highest temperature at which the gauge is still reliable?
    (a) 120°F _____
    (b) 240°F __X__
    (c) 360°F _____
    (d) 50°F _____

30. If two technicians are working on a construction site with nuclear gauges, measurements should not be made when the distance between gauges is less than:
    (a) 100 feet_____
    (b) 20 feet_____
    (c) 30 feet__X__
    (d) 50 feet_____

MILWAUKEE TESTING

EXAMINATION FOR USERS OF TROXLER "MOISTURE-DENSITY" GAUGES

31. Must the nuclear gauge and cabinet be locked to protect against accidental exposure or unauthorized use? When?
    (a) Yes, but only in lab_____
    (b) Not at all _____
    (c) Yes, always (in lab, and during transportation) __X__
    (d) Yes, but only in field_____

32. Are you authorized to use a guage for private purposes; or without license and safety film badge?
    (a) Yes_____
    (b) No__X__

33. Does the "Transportation Safety Act of 1975" allow shipment of nuclear gauges on passenger aircraft?
    (a) Yes_____
    (b) No__X__

34. How do you compute the dry density of soil?
    (a) Wet density pcf + moisture %_____
    (b) Wet density pcf - moisture pcf__X__
    (c) Wet density pcf + maximum obtainable density _____
    (d) Wet density - optimum moisture_____

35. How do you compute the moisture content of soil (%)?
    (a) Wet density/dry density_____
    (b) Moisture pcf x optimum moisture_____
    (c) Moisture pcf/dry density__X__
    (d) Dry density/moisture pcf_____

36. How do you compute the relative compaction (%)?
    (a) Dry density/maximum obtainable density__X__
    (b) Moisture % x wet density_____
    (c) Wet density/maximum obtainable density_____
    (d) Moisture pcf x moisture %_____

GRADING SYSTEM:

80%, or Better = Passing
Below 80% = Fail

MILWAUKEE TESTING

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ITEM 16 FORMAL TRAINING IN RADIATION SAFETY

JOHN W. DOUGHERTY, P.E.

Training and Experience:

1. Formal Training

1959 - U.S. Marine Corps Schools, Basic School. Received instruction in principles and practices of radiation protection, monitoring techniques and instruments, calculations basic to measurement of radiation. (Approximately 4 hours of classroom instruction.)

1962 - U.S. Marine Corps Schools Extension, Junior School. Self study, graded problems and examination in the effects of radiation, protection of individuals against radiation, design of protective shelters, calculation of radiation effects from nuclear weapons. (Approximately 40 hours total time.)

1975 - Troxler Laboratories. Completed safety and operation course for Troxler nuclear moisture density gauges. (4 hours.)

WILLIAM G. ALEKS, P E. Completed Troxler Laboratories Training course July 19-19, 1977 and has operated nuclear density gauges at Milwaukee Testing since that time.

STEVEN BECKER Received radiological training (1964) at U.S. Army Ordnance Guided Missile School and Army Chemical, Biological and Nuclear Warfare seminars during the period of 1965 - 1967. Training included health effects of radiation and protection against radiologic hazards.

Experience includes work as an industrial X-Ray technician from 1960 to 1970 and regular use of various nuclear density gauges from 1971 to the present.

RAYMOND STEVENS Received radiological safety training and instruction in use of nuclear density gauges (1977) while attending Milwaukee Area Technical College.

Experience includes regular use of nuclear density gauges since 1978.

MILWAUKEE TESTING

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ITEM 17 EXPERIENCE

John W. Dougherty

1959 - 1960 U.S. Marine Corps Engineer Office.
Responsible for training radiation principles and protection of personnel against radiation from nuclear weapons.

1969 - 1975 Law Engineering Testing Co., Jacksonville, Fla.
Responsibilities during this period included supervision of 4 radiographers involved in the radiographic inspection of pressure vessels, ship repairs, and structural welding. Radio-isotopes used was Iriduim 192 with 100 Curie maximum activity. Duties included monitoring of equipment and storage area, safety training, record keeping, and occasional field radiography.

1975 - 1978 Commercial Testing Laboratories, Denver, Colorado.
Responsible for supervision of up to 8 technicians using Troxler nuclear moisture-density gauges (models 2401 and 3401). During this period I was authorized by the State of Colorado Department of Public Health to administer the instruction and examinations required by the State for licensing and use of nuclear moisture-density gauges.

1979 - Present Warzyn Engineering, Inc., Dubuque, Iowa and Milwaukee, Wisconsin.
Responsible for the supervision of technicians using Troxler and Seaman Nuclear Corp. nuclear moisture-density gauges.

MILWAUKEE TESTING